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QUARTERLY REPORT

**Guidelines for the Identification of Stress Corrosion Cracking
Sites and the Estimation of Re-Inspection Intervals for Stress
Corrosion Cracking Direct Assessment**

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LEADING PIPELINE RESEARCH

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Project Background

The objective of this project is to develop a set of quantitative guidelines for predicting where and when Stress Corrosion Cracking (SCC) might be an integrity threat for gas and liquid hydrocarbon pipelines. These objectives will be achieved over 24 months through the following tasks:

- Task 1: Data Collection – Data will be collected from the literature, company or field records, pipeline operators, and regulators;
- Task 2: Data Analysis – Analysis of field and laboratory data to derive relationships describing susceptibility to SCC, crack initiation, crack growth and dormancy, and crack growth to failure;
- Task 3: Documentation – Document the results of the data analysis task;
- Task 4: Technology Transfer – Disseminate the results of this work to the industry; and
- Task 5: Administration and Reporting – Direct and document the research and report on project progress and results.

Technical Status

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A meeting was held between the project PI (F. King), Raymond Fessler (PRCI Stress Corrosion Cracking (SCC) coordinator), and Jenny Been (subcontractor) for a PRCI-funded SCC project) to discuss the co-ordination of data collection activities between various DOT and PRCI-funded SCC projects. This co-ordination initiative was at the request of PRCI member companies, and resulted in some delays in the original schedule.

It was decided to conduct the survey of pipeline companies in two parts. The initial survey (Part 1) will comprise a series of questions designed to identify those companies with extensive databases. This initial survey will ask about the company's specific experiences with SCC, the nature and extent of company records, and general description of their pipeline system(s). The responses to these questions will be used to identify those companies that should be approached for Part 2 of the data collection exercise.

In Part 2, identified companies with extensive experience and records will be further interviewed. Data collection will take the form of an additional detailed questionnaire, telephone interviews, or site visits. The purpose of Part 2 is to obtain as much specific information as possible regarding the conditions under which SCC has, and has not, been observed.

Pipeline companies in the US, Canada, S America, Europe, the Middle East, and Australia will be canvassed. The intent is to ensure the data collection is as comprehensive and as broad-based as possible.

Contact has been made with a representative of a group of Russian and Kazakh pipeline operators. These operators have extensive experience with SCC and are prepared to share their data. The format of the available data is not currently known, but will be determined in the next quarter.

Discussions have been held with a statistician (Prof Peter Ehlers, University of Calgary) regarding statistical approaches to the SCC field data. Various logistical regression techniques were proposed as possible methods, the final choice of technique depending upon the nature and extent of available data. Statistical analysis is required to determine the significance of trends and observations derived from the field data.

Results and Conclusions

Data collection from literature surveys, pipeline operator records, and foreign SCC mitigation practices is on-going. The field data collected will be used to validate the SCC model developed from various R&D programs. The literature component of the project is well under way. Literature searches have been conducted and approximately 150-200 papers, company reports, book articles, and conference presentations have been collected.

These articles are currently being reviewed and summarized for the study. The various studies are being categorized as relating to one or more of the four modules in the proposed model:

1. susceptibility,
2. initiation,
3. early-stage growth, and
4. late-stage growth.

For example, a recently completed PRCI project on the inhibitive effects of organics relates clearly to the susceptibility module, but also contains information of use in the initiation module. Another example is a project on the transition of shallow cracks to deep cracks. Results from this study will be used to inform both initiation and early-stage growth modules, as well as the transition to late-stage cracking.

Results from the data collection tasks will be categorized, analyzed and reported in future progress reports.

Plans for Future Activity

The following activities are anticipated for the next milestone period:

Technical Progress

Complete the data collection survey and canvass PRCI member companies. Continue with literature review and begin model development. Currently available literature will be reviewed and additional information collected. The basis for the SCC model will be started to be formulated.

Meeting and Presentations

A second meeting is planned in Calgary during the week of March 19 to finalize the Part 1 questionnaire. The form will then be sent to the targeted companies for completion.

Tests and Demonstrations

No tests or demonstrations are planned for the next reporting period.